

## **UST SYSTEM INSTALLATION AND MAINTENANCE OUTLINE**



**ENERGY AND ENVIRONMENT CABINET  
DIVISION OF WASTE MANAGEMENT  
UNDERGROUND STORAGE TANK BRANCH  
200 FAIR OAKS LANE, SECOND FLOOR  
FRANKFORT, KENTUCKY 40601  
(502) 564-5981**

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## **1.0 INTRODUCTION**

This document establishes the requirements regarding the design, installation, and maintenance of double-walled tanks and piping and secondarily-contained ancillary equipment. Double-walled tanks and piping and secondarily-contained ancillary equipment are designed to be more protective of the environment than traditional single-walled UST systems. However, the design of these UST systems alone is not sufficient to prevent releases. Proper installation, operation, monitoring and maintenance are necessary to prevent releases to the environment.

NOTE: The provisions of this outline are not applicable to tanks and piping installed prior to April 1, 2012.

Tanks installed after April 1, 2012 shall meet the requirements in 401 KAR 42:020 and this outline.

When an existing tank is replaced with a new tank, the new tank shall not be connected to existing piping unless that piping also meets the standards in 401 KAR 42:020 and this outline.

An existing tank may not be removed and reinstalled unless it meets the requirements in 401 KAR 42:020 and this outline. Before any existing tank can be reinstalled, the tank shall be inspected and tested by the equipment's manufacturer and the owner or operator shall provide a written certification from the manufacturer that the tank is suitable for reinstallation.

100 percent of a piping run, extending from the tank to the farthest dispenser or other end-use equipment, excluding connectors, installed after April 1, 2012 shall meet the requirements in 401 KAR 42:020 and this outline.

Sumps installed after April 1, 2012 shall meet the requirements in 401 KAR 42:020 and this outline.

Under-Dispenser Containment (UDC) as required in 401 KAR 42:020 and this outline shall be installed for all new dispensers installed after April 1, 2012.

If an existing dispenser is replaced after April 1, 2012, and any equipment below the shear valve or union used to connect the dispenser to the piping (e.g. flexible connectors, risers, and other transitional components) is replaced, UDC shall be installed in accordance with 401 KAR 42:020 and this outline.

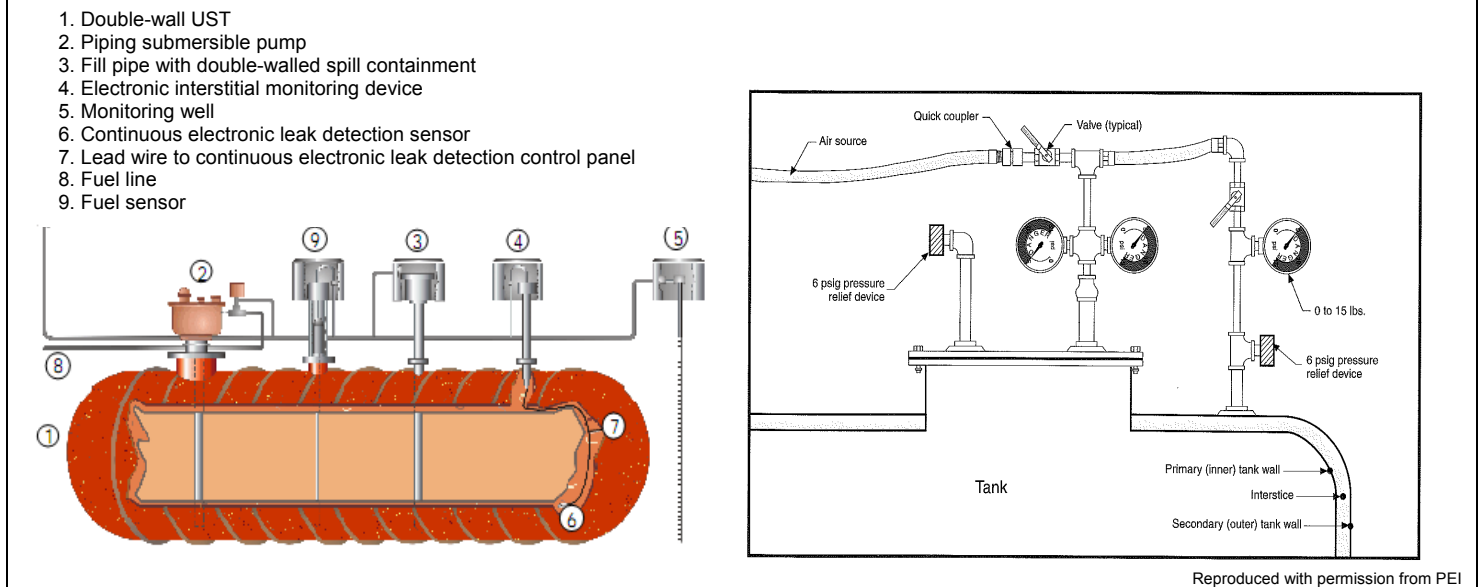
## **2.0 DESIGN, INSTALLATION, AND MAINTENANCE REQUIREMENTS FOR UST SYSTEMS**

### **2.1 Design and Manufacturing of UST Systems**

UST systems shall be designed and manufactured in accordance with the performance standards for new UST systems in 401 KAR 42:020 and 40 C.F.R. 280.20. UST systems shall:

- Be equipped with double-walled tanks and double-walled piping;
- Contain regulated substances within the outer wall of the double-walled tank or double-walled piping until the substances are detected and removed if an inner wall failure occurs;
- Be compatible with the substances stored in the tank;
- Prevent releases of regulated substances to the environment at any time during the operational life of the UST system; and
- Be designed to allow for continuous interstitial monitoring.

**Figure 1 - Illustrations of a Double-Walled UST System**



UST systems shall be designed and manufactured in accordance with a code of practice or industry standard developed by a nationally recognized association or independent testing laboratory. Examples of recognized associations and testing laboratories include Underwriters Laboratories, Inc., Underwriters Laboratories of Canada, Steel Tank Institute, American Society of Mechanical Engineers, National Association of Corrosion Engineers, American Petroleum Institute, National Fire Protection Association, and American Society of Testing and Materials.

## **2.2 UST System Installations**

UST systems shall be designed and installed in accordance with the equipment manufacturers' recommendations. UST systems shall be installed in a manner that will prevent releases of regulated substances for the entire operating life of the UST system. UST system installations shall be performed by an installation contractor who holds a current certification issued by the State Fire Marshal's Office, in accordance with 815 KAR 30:060. UST system installations shall be performed in accordance with a code of practice or industry standard developed by a nationally recognized association or independent testing laboratory, such as American Petroleum Institute Publication 1615, "Installation of Underground Petroleum Storage Systems", Petroleum Equipment Institute Publication RP100-05, "Recommended Practices for Installation of Underground Liquid Storage Systems", or their equivalents. UST system installations shall comply with the applicable sections of National Fire Protection Association (NFPA) Code 30, "Flammable and Combustible Liquids Code", and NFPA Code 30A, "Code for Motor Fuel Dispensing Facilities and Repair Garages".

## **2.3 Operation and Maintenance of UST Systems**

UST systems shall be operated, tested, and maintained in accordance with the equipment manufacturers' recommendations. UST systems shall be operated and maintained in a manner that will prevent releases of regulated substances for the entire operating life of the UST system. UST system equipment shall not be stored, transported, handled, or installed in a manner that might damage the equipment or void the equipment manufacturers' warranty. Any UST system equipment found to be damaged, degraded, deteriorated, corroded, non-functioning, improperly designed, improperly installed, leaking, incompatible, or otherwise not performing in accordance with the equipment manufacturers' original design specifications, the applicable regulations, or this outline shall be immediately repaired, replaced, or permanently closed.

Owners and operators shall follow the inspection, maintenance, and testing requirements in 401 KAR 42:020, 42:030, 42:040, 42:050, and 42:070 and this outline. Owners and operators may also refer to applicable guidance documents, recommended practices, or industry standards for recommendations on properly operating and maintaining a UST system. Operation and Maintenance guidance documents include U.S. Environmental Protection Agency Documents EPA 510-B-05-002, "Operating and Maintaining Underground Storage Tank Systems: Practical Help and Checklists," and EPA 510-R-05-001, "UST Systems: Inspecting and Maintaining Sumps and Spill Buckets: Practical Help and Checklist"; and Petroleum Equipment Institute Publication RP900-07, "Recommended Practices for the Inspection and Maintenance of UST Systems".

## 2.4 Double-Walled Tanks

All new tanks installed after April 1, 2012 shall be designed and manufactured with double-walled construction consisting of an inner and outer wall with an interstitial space between the tank walls. The interstitial space shall be continuously monitored for releases using a method of interstitial monitoring certified, as of the time of testing, by an independent third-party evaluator. An example is illustrated in Figure 1. Both the inner and outer tank walls shall be designed to allow testing for structural integrity and tightness. Tanks shall be designed and manufactured to contain regulated substances within the outer tank wall until the substances can be detected and removed if an inner tank wall failure occurs. All tank openings shall be equipped with liquid-tight caps or covers. Tanks shall be operated and maintained to prevent releases of regulated substances and the ingress of water for the operating life of the tank.

## 2.5 Double-Walled Piping

All new piping installed after April 1, 2012 shall be designed and manufactured with double-walled construction consisting of an inner and outer wall with an interstitial space between the piping walls. The interstitial space shall be continuously monitored for releases using a method of interstitial monitoring certified, as of the time of testing, by an independent third-party evaluator. Examples are illustrated in Figure 2. Both the inner and outer piping walls shall be designed to allow testing for structural integrity and tightness. Piping shall be designed and manufactured to contain regulated substances within the outer piping wall until the substances can be detected and removed if an inner piping wall failure occurs.

All nonmetallic piping shall meet or exceed the Standard for Safety established by Underwriters Laboratories Inc. in UL 971 – "Standard for Nonmetallic Underground Piping for Flammable Liquids", July 1, 2005. Piping shall be operated and maintained to prevent releases of regulated substances for the operating life of the piping.

**Figure 2 – Double-Walled Piping Illustrations**



1. Double-walled Fiberglass Coaxial Pipe – This piping has a 90% closed interstice with the remaining 10% of the space packed with very fine sand between the inner and outer walls. Release detection sensor should be placed in the piping sump.
2. Double-walled Semi-rigid with Interstitial Space – On this piping, the release detection sensor is located inside the interstitial space.
3. Double-walled Fiberglass Pipe with Open Interstitial Space – On this piping, the release detection sensor is located inside the interstitial space.
4. Double-walled Flexible Pipe with Closed Interstice – Release detection sensor should be located in the piping sump.

### 2.5.1 Exception to Double-Walled Requirements for Suction Piping

Interstitial monitoring shall not be required for “European” or “safe” suction systems if the following criteria are met:

- (a) The below-grade piping operates at less than atmospheric pressure;
- (b) The below-grade piping is sloped so that the contents of the piping will drain back into the tank if the suction is released;
- (c) Only one check valve is installed for each piping run; and
- (d) The check valve is located directly below and as close as practical to the suction pump.

If suction piping is installed that is not a “European” or “safe” suction system, interstitial monitoring shall be required.

The point at which the suction piping connects to the stub-out/riser tank shall be installed within a liquid-tight containment sump in accordance with Section 2.7 of this outline. Suction piping shall be installed with a ball valve or a product line isolation valve contained within the containment sump which will allow the suction piping to be isolated for precision line tightness testing without breaking the pipe connections. The containment sump is not required to be continuously monitored if the suction piping is a “European” or “safe” suction system.

### 2.6 Design, Installation, and Maintenance Requirements for Liquid-Tight Sumps

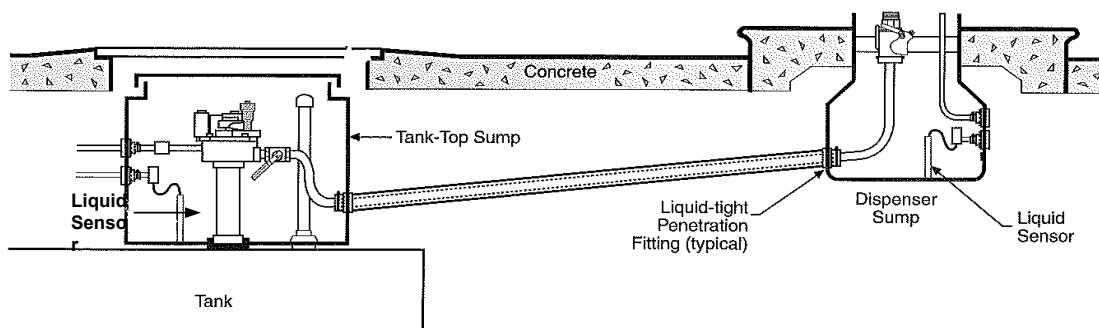
In accordance with 401 KAR 42:020, all new or replaced piping installed after April 1, 2012, shall include the installation of liquid-tight containment sumps for:

- Connections at the top of a tank (e.g. submersible pumps, interstitial risers, automatic tank gauge (ATG) risers);
- Any point where different types of piping are joined underground; and
- Any portion of the piping system located between a tank and dispenser where liquid would likely accumulate within the interstitial space of the piping system.

Liquid-Tight sumps shall be compatible with the substance stored, and continuously monitored for the presence of liquids. See Section 2.6.1 of this outline for an exception to this requirement for “European” or “safe” suction piping. An example of a liquid-tight sump is illustrated in Figure 3.

Sumps shall be liquid-tight on all sides and at all penetrations, and shall be designed to prevent water ingress and product loss. Sumps shall be designed to be structurally suitable for underground burial applications and with sufficient structural integrity to resist the forces associated with backfill, high ground water, ground movement, and vehicular traffic. Sumps shall be designed to allow for visual inspection and access to the components in the sump and to accommodate the installation of electronic monitoring devices. Regulated substances, water, or debris shall not be allowed to accumulate in any sump. All liquid accumulations and debris in any sump shall be immediately removed.

**Figure 3 – Sump Illustrations**



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## 2.7 Design, Installation, and Maintenance Requirements for Under-Dispenser Containment (UDC)

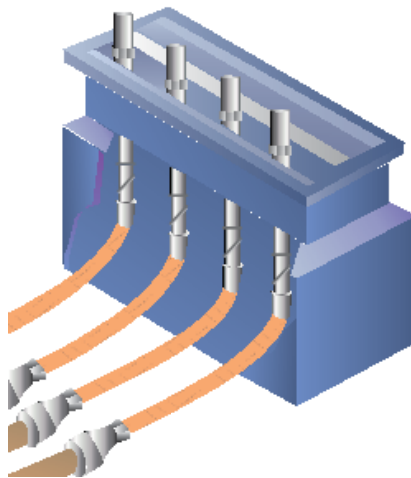
In accordance with 401 KAR 42:020, the installation of liquid-tight Under-Dispenser Containment (UDC) shall be required for all new or replaced dispensers, installed after April 1, 2012, when the following conditions exist:

- A new dispenser is installed in an area where a UST system dispenser did not previously exist; or
- The equipment below the shear valve (e.g. flexible connectors, risers, and other transitional components) used to connect the dispenser to the piping is replaced in conjunction with the replacement of an existing dispenser.

NOTE: If a non-contained dispenser is replaced with a new dispenser which connects to the piping, utilizing the existing connecting equipment, this replacement would not require the addition of UDC.

UDC shall be liquid-tight on all sides and at all penetrations, and shall be designed to prevent water ingress and product loss. UDC shall be designed to be structurally suitable for underground burial applications and with sufficient structural integrity to resist the forces associated with backfill, high ground water and ground movement. UDC shall be designed to allow for visual inspection and access to the components in the UDC and to accommodate the installation of electronic monitoring devices. Regulated substances, water, or debris shall not be allowed to accumulate in any UDC. All liquid accumulations and debris in any UDC shall be immediately removed. See Figure 4 for an illustration of Under Dispenser Containment.

**Figure 4 – Under-Dispenser Containment Illustrations**



## 3.0 RELEASE DETECTION REQUIREMENTS FOR UST SYSTEMS

### 3.1 Release Detection Requirements for UST Systems

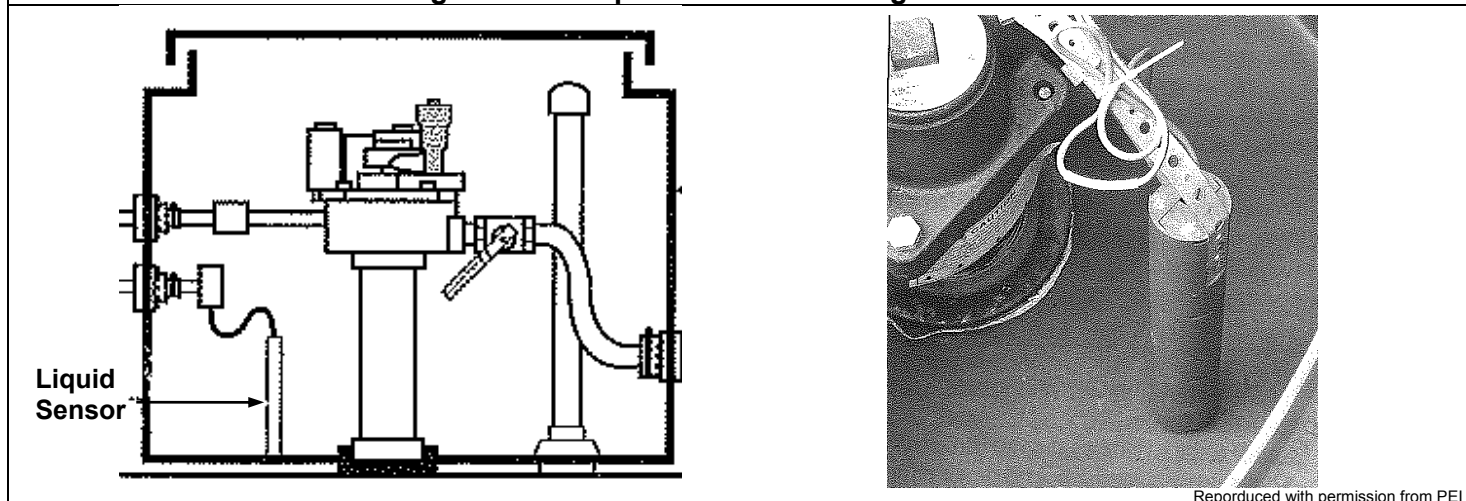
Owners and operators shall continuously monitor tanks and piping for the presence of a release. An electronic method of continuous interstitial monitoring, certified by an independent third-party evaluator, shall be the primary release detection method for tanks and piping.

Sumps and UDC shall be continuously monitored for liquids by a monitoring device, certified by an independent third-party evaluator, such as a liquid float sensor, optical sensor, magnetostrictive sensor, or other sensor approved by this cabinet (see Section 2.5.1 of this outline for an exception for “safe” suction piping). All sensors shall be installed in accordance with the sensor manufacturers’ instructions. Sensors shall be properly anchored and positioned below the lowest penetration point within the sump or UDC so that the device can detect the presence of liquids in the sump or UDC. An example of a sump sensor positioning is illustrated in Figure 5.

If the electronic device used for interstitial monitoring is capable of printing sensor readings, owners and operators shall obtain a record, at least once every thirty (30) days, to verify that release detection is being

performed and that releases have not occurred. If the device is not capable of printing sensor readings, a monthly log shall be maintained to verify that release detection is being performed and that releases have not occurred. This shall be documented on Visual Interstitial Log, DEP 5041, incorporated by reference in 401 KAR 42:040. All release detection records for the most recent monthly verification and for the preceding 12 months shall be maintained. Release detection equipment shall be operated and maintained in accordance with the equipment manufacturers' recommendations, 401 KAR 42:040, and this outline.

**Figure 5 – Sump Sensor Positioning Illustrations**



When a sump sensor alarm is triggered, the owner or operator shall ensure that the sump is immediately inspected for the presence of free product. If free product is discovered within a sump, a suspected release shall be reported in accordance with 401 KAR 42:050. The presence of regulated substances in an interstitial space of a double-walled tank shall be reported as a suspected release in accordance with 401 KAR 42:050. Owners and operators shall investigate, and conduct repairs if necessary, in response to any suspected release. Within twenty-four (24) hours of discovery, owners and operators shall follow the equipment manufacturers' instructions for removing regulated substances from an interstitial space, sump, UDC, or other containment device.

### **3.2 Additional Release Detection Requirements for Pressurized Piping**

All pressurized piping shall be equipped with an automatic line leak detector, certified by an independent third-party evaluator, capable of detecting a leak from the piping of three (3) gallons-per-hour at ten (10) pounds per square inch of line pressure. Line leak detectors are required in addition to the continuous interstitial monitoring of pressurized double-walled piping. Line leak detectors shall be designed and operated to alert the operator to the presence of a leak by restricting or shutting off the flow of regulated substances through the piping or by triggering an audible or visual alarm. The automatic line leak detector may be either an electronic line leak detector or a mechanical line leak detector.

## **4.0 TESTING AND INSPECTION REQUIREMENTS FOR UST SYSTEMS**

### **4.1 Testing Requirements for UST Systems at Installation**

The inner wall of the tank and piping shall test tight after installation, before dispensing from the UST. The tightness test shall be conducted by a tester who meets the requirements established in 401 KAR 42:040, Section 5. Testers shall use a method of tightness testing certified, as of the time of testing, by an independent third-party evaluator. Testers shall not use a test method or device that may cause damage to the UST system.

The outer wall of the tank and piping shall test tight after installation, before dispensing from the UST. The test shall be conducted by a tester who meets the requirements established in 401 KAR 42:040, Section 5. Testers shall test the integrity of the outer wall of the tank and piping by following testing procedures prescribed by the

tank and piping manufacturers. Testers shall not use a test method or device that may cause damage to the UST system.

Sumps and UDC shall be tested for liquid-tightness prior to dispensing from the UST system. Testers shall conduct a hydrostatic test or use a test method approved by the device's manufacturer to ensure liquid-tightness.

Owners and operators shall maintain all testing records for a period of five (5) years, in accordance with 401 KAR 42:040, Section 6.

#### **4.2 Periodic Testing of Sumps and Under-Dispenser Containment**

Sumps and UDC shall be tested for liquid-tightness at least every three (3) years. Testers shall conduct a hydrostatic, vacuum, or other manufacturer-approved integrity test to verify liquid-tightness. Owners and operators shall maintain written documentation of the test results for at least three (3) years. Owners and operators shall provide copies of the test results to the cabinet in accordance with 401 KAR 42:030, Section 3.

#### **4.3 Annual Testing of Electronic Release Detection Equipment**

Electronic release detection equipment shall be operationally tested annually by a tester who meets the requirements established in 401 KAR 42:040, Section 5. Electronic release detection equipment includes automatic tank gauge consoles and probes; interstitial monitoring consoles, probes, and sensors; and other electronic devices designed to detect releases of regulated substances, except for electronic line leak detectors, which shall be tested in accordance with Section 4.3.1 of this outline. Owners and operators shall maintain written documentation of the test results until the next test is conducted and provide copies of the test results to the cabinet in accordance with 401 KAR 42:040, Section 2.

##### **4.3.1 Annual Testing of Automatic Line Leak Detectors**

All automatic line leak detectors installed on pressurized piping systems shall be performance tested annually by a tester who meets the requirements established in 401 KAR 42:040, Section 5. Performance testing is required for both manual and electronic line leak detectors, even if the equipment manufacturer designates the line leak detector as "self-testing". The performance test shall verify that the automatic line leak detector is capable of detecting a leak rate equivalent to three (3) gallons-per-hour at ten (10) pounds per square inch of line pressure, in accordance with 401 KAR 42:040, Section 5. Owners and operators shall maintain written documentation of the test results until the next test is conducted. Owners and operators shall maintain written documentation of the test results until the next test is conducted and provide copies of the test results to the cabinet in accordance with 401 KAR 42:040, Section 2.

#### **5.0 WATER ACCUMULATION IN TANKS**

Owners and operators shall remove any water accumulation within a tank that is identified through the use of a properly calibrated electronic monitoring device as soon as practicable. If the presence of water in the tank is caused by equipment failure or if the cause cannot be explained, then the owner or operator shall immediately report a suspected release to the cabinet in accordance with 401 KAR 42:050, Section 1.